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ABSTRACT

This study reports the results of a best-evidence synthesis of research on the use of one-to-one tutoring delivered by adults to students in the primary grades who are learning to read. The synthesis includes research on five programs: Reading Recovery, Success for All, Prevention of Learning Disabilities, the Wallach Tutorial Program, and Programmed Tutorial Reading. All five programs showed substantial positive effects on student reading achievement. Two studies found cumulative effects of one-to-one tutoring, and one found lasting but diminishing effects. The five programs showed substantially more positive effects on student reading achievement than did other programs with similar costs. Positive effects included reduction of class size and provision of aides to classes. In Table 1, characteristics of the programs are summarized in terms of the location of the evaluation, tutor qualifications, tutee characteristics, duration of intervention, and tutoring methods and curriculum. Thirty-five references are cited. (Author/RH)

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Preventing Early Reading Failure With One-To-One Tutoring: A Best-Evidence Synthesis

Barbara A. Wasik

and

Robert E. Slavin

Report No. 6

June 1990

CENTER FOR RESEARCH ON EFFECTIVE SCHOOLING FOR DISADVANTAGED STUDENTS

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The Center

The mission of the Center for Research on Effective Schooling for Disadvantaged Students (CDS) is to significantly improve the education of disadvantaged students at each level of schooling through new knowledge and practices produced by thorough scientific study and evaluation. The Center conducts its research in four program areas: The Early and Elementary Education Program, The Middle Grades and High Schools Program, the Language Minority Program, and the School, Family, and Community Connections Program.

The Early and Elementary Education Program

This program is working to develop, evaluate, and disseminate instructional programs capable of bringing disadvantaged students to high levels of achievement, particularly in the fundamental areas of reading, writing, and mathematics. The goal is to expand the range of effective alternatives which schools may use under Chapter 1 and other compensatory education funding and to study issues of direct relevance to federal, state, and local policy on education of disadvantaged students.

The Middle Grades and High Schools Program

This program is conducting research syntheses, survey analyses, and field studies in middle and high schools. The three types of projects move from basic research to useful practice. Syntheses compile and analyze existing knowledge about effective education of disadvantaged students. Survey analyses identify and describe current programs, practices, and trends in middle and high schools, and allow studies of their effects. Field studies are conducted in collaboration with school staffs to develop and evaluate effective programs and practices.

The Language Minority Program

This program represents a collaborative effort. The University of California at Santa Barbara is focusing on the education of Mexican-American students in California and Texas; studies of dropout among children of recent immigrants are being conducted in San Diego and Miami by Johns Hopkins, and evaluations of learning strategies in schools serving Navajo, Cherokee, and Lumbee Indians are being conducted by the University of Northern Arizona. The goal of the program is to identify, develop, and evaluate effective programs for disadvantaged Hispanic, American Indian, Southeast Asian, and other language minority children.

The School, Family, and Community Connections Program

This program is focusing on the key connections between schools and families and between schools and communities to build better educational programs for disadvantaged children and youth. Initial work is seeking to provide a research base concerning the most effective ways for schools to interact with and assist parents of disadvantaged students and interact with the community to produce effective community involvement.

Abstract

This study reports the results of a best-evidence synthesis of the research on the use of one-to-one tutoring delivered by adults to students in the primary grades who are learning to read. Research on five programs was synthesized: Reading Recovery, Success for All, Prevention of Learning Disabilities, the Wallach Tutorial Program, and Programmed Tutorial Reading. All five programs showed substantial positive effects on student reading achievement. Two studies found cumulative effects of one-to-one tutoring and one study found lasting but diminishing effects. The five programs showed substantially more positive effects on student reading achievement than other similarly expensive programs -- reduction of class size and provision of aides in the classroom.

Introduction

Tutoring is the oldest form of instruction. Parents have always provided one-to-one instruction to their children, and learning settings from driving instruction to on-the-job training typically employ one teacher for each learner for at least part of the learner's instruction.

In elementary and secondary instruction, one-to-one tutoring exists around the margins of group instruction. For example, teachers often work with individual children during seatwork periods, recess, study hall, or after school. Parents often hire tutors to work with their children. Tutoring is often used in special education, and sometimes in other remedial programs such as compensatory education.

The topic of tutoring has come to the fore in recent years because of a renewed focus on students who are at risk of school failure, coupled with a renewed commitment to see that all students learn basic skills in the early grades. In particular, modest effects of traditional Chapter 1/Title I pullout programs (Carter, 1984) and loosening of restrictions on uses of Chapter 1 funds have contributed to a broader range of services being provided under Chapter 1 funding. One-to-one tutoring is one option often being considered or implemented.

One particularly important application of tutoring that has increased in recent years is the use of tutors with first graders to prevent early reading failure. First grade is seen as a critical year for the learning of reading, and reading success in the early grades is seen as an essential basis for success in the later grades. Disadvantaged third graders who are significantly behind in reading or have been retained have little chance of ultimately graduating from high school (Lloyd, 1978). Observing how much progress is made in reading between the first and last days of first grade by the average reader, it seems obvious that students who fail to learn to read during first grade are far behind their peers and are unlikely to ever catch up. Research on Chapter 1 suggests that remediation of learning deficits after the primary grades is largely ineffective (see Kennedy, Birman, & Demaline, 1986). It makes much more sense to prevent learning deficits in the first place than to attempt to remediate them in the later grades.

The major drawback to tutoring is its cost. Providing tutoring to large numbers of students across the grade spans would, of course, be prohibitive. But if there is in fact a "critical period" for learning to read and tutors can be used to substantially increase the proportion of students who successfully navigate it, the use of this expensive intervention may be cost-effective.

The importance of understanding the effects of first-grade tutoring goes far beyond the pedagogical and technical issues involved. Ron Edmonds' (1981) statement that every child can learn and Benjamin Bloom's (1981) assertion to the same effect contributed to a variety of discussions among policy makers about learning as an "entitlement" for all children, on the basis that if every child can learn, the schools have an ethical and perhaps legal responsibility to see that every child does learn. One manifestation of this point of view is a document produced by the Council of Chief State School Officers (1987) that describes model state statutes to entitle every child not only to an appropriate education but to success in achieving an acceptable level of performance (also see Council of Chief State School Officers, 1989). If success is seen as an entitlement, educators must have methods which produce success for all non-retarded children regardless of home background, no matter how expensive these methods may be. In any discussion along these lines, one-to-one tutoring for at-risk students is sure to be one element of the strategy to ensure success for all.

There is at present an unprecedented willingness among educators to adopt expensive early intervention programs if they are believed to reliably produce large effects. Examples of this include Project STAR in Tennessee and Project Prime Time in Indiana, which have implemented substantially reduced class sizes in the early elementary grades. Growing provision of preschool and extended day kindergarten programs and of Writing to Read are other examples. In a time when policy makers are willing to consider expensive but potentially effective approaches for at-risk children, preventive tutoring becomes an attractive option.

Few would doubt that one-to-one tutoring from trained adults would have a positive effect on stu-

dent achievement. What is more important to know is how large the effect of tutoring is (in comparison to plausible alternatives), to what degree effects of tutoring maintain over time, and which specific tutoring programs and practices produce the largest gains in student reading achievement. The purpose of this paper is to review the research on the effectiveness of one-to-one tutoring programs to identify what is currently known about the answers to these and other questions.

Previous reviews of research on tutoring have primarily focused on peer tutoring (e.g., Devin Sheenan, Feldman, & Allen, 1976; Scruggs & Richter, 1985). The one review which included tutoring by adults primarily focused on applications in special education (Polloway, Cronin, & Patton, 1986). None of these earlier reviews discussed any of the first grade reading prevention models emphasized in this paper.

Why Should Tutoring be Effective?

Tutoring is usually provided in reading or mathematics to students in the early elementary grades. Tutoring sessions typically last from 15-30 minutes per day. Why should such a small amount of time be expected to make a substantial difference in achievement?

The potential of the one-to-one instructional setting is shown in a model of instructional effectiveness described by Slavin (1987). This model, based on the alterable components of Carroll's (1963) model of school learning, proposes that there are four elements of effective instruction.

1. *Quality of instruction:* The degree to which information or skills are presented so that students can easily learn them. Quality of instruction is largely a product of the quality of the curriculum and of the lesson presentation itself.

2. *Appropriate levels of instruction:* The degree to which students are ready to learn a new lesson (that is, have the necessary skills and knowledge to learn it) but have not already learned the lesson. The level of instruction is appropriate when a lesson is neither too difficult nor too easy for students.

3. *Incentive:* The degree to which the teacher makes sure that students are motivated to work on instructional tasks and to learn the material being presented.

4. *Time:* The degree to which students are given enough time to learn the material being taught.

The elements of this QAIT (Quality, Appropriateness, Incentive, Time) model are hypothesized to be multiplicatively related to achievement gain. This means that if any one is zero, learning gains will be zero, but it also implies that improvements in multiple elements will produce much larger gains than improvements in any one element.

One-to-one tutoring is likely to bring about substantial improvement in at least three of the four elements of the QAIT model. One is appropriate levels of instruction; a tutor is able to completely adapt the level, pace, and content of instruction to the needs of the child being tutored. If the child needs additional instruction, the tutor knows this immediately and can provide it. If the child is catching on, the tutor can move on to new material. Note that this ability to fully adapt to students' unique needs is eroded even in one-to-two or one-to-three instruction, where adaptation to individual needs becomes progressively more difficult.

A second impact is on incentives for learning. The tutor can devote full attention to the child, which in itself is motivating. Also, the tutor is fully aware of when the student is exerting maximum effort and when he or she is not. As a result, the tutor can immediately praise appropriate behavior, providing a close linkage for the child between behavior and outcome. Children being tutored are hardly ever off task.

Third, tutoring is usually provided in addition to regular classroom instruction, and therefore adds to instructional time. This addition is probably more than that provided by the additional clock time, as students are likely to be on task and actively learning a much higher proportion of the time in the tutoring period than in the classroom.

The QAIT element not obviously enhanced by tutoring is the quality of instruction. This depends on the skills and training of the tutor and the quality of the instructional materials. There may be a tradeoff of quality against the other benefits of tutoring, as when tutoring is provided by persons who are not certified teachers in lieu of regular classroom instruction, but in other applications the

quality of instruction in tutoring is as high or higher than that provided in the regular class.

The likely impact of one-to-one tutoring on at least three QAIT elements should in turn produce large impacts on student learning. However, the tutoring setting provides only the *potential* for improvement in each element. There is no magic in placing a tutor with a tutee -- the quality of instruction and of curriculum materials and the degree to which tutors actually adapt instruction to the needs of tutees, motivate them to do their best, and make effective use of time will determine the ultimate impact of tutoring on students.

Review Methods

This review uses a set of procedures called "best-evidence synthesis," which combines elements of meta-analysis with those of traditional narrative reviews. Briefly, a best-evidence synthesis requires locating all research on a given topic and discussing the substantive and methodological issues in the research as in a narrative review. Prior criteria for germaneness to the topic at hand and for methodological adequacy are typically applied. Whenever possible, study outcomes are characterized in terms of effect size (ES), the difference between experimental and control means divided by the control group standard deviation (see Glass, McGaw, & Smith, 1981). The numerator of the effect size formula may be adjusted for pretests or covariates by computation of gain scores or use of ANCOVA, but the denominator is always the unadjusted individual level standard deviation of the control group or (if necessary) a pooled standard deviation (see Slavin, 1987).

Inclusion Criteria. Studies were included in the present review if they evaluated one-to-one instruction delivered by adults (certified teachers, paraprofessionals, or volunteers) to students in the primary grades who are learning to read for the first time. Studies had to compare tutoring to traditional instruction in elementary schools over periods of at least four weeks on measures of objectives pursued equally in experimental and control conditions. This duration requirement did not exclude any studies of first-grade tutoring. Note that the methodological inclusion criteria applied in the present review are essentially identical to those applied in earlier best-evidence syntheses on mastery learning (Slavin, 1987a) and ability grouping (Slavin, 1987b, in press).

Research on Preventive Tutoring Programs

Evaluations of five programs which used one-to-one tutoring to prevent reading failure in the early grades met the inclusion criteria specified above. Some of the major characteristics of these programs are summarized in Table 1, and the programs and the research done to evaluate them are described in detail in the following sections.

Table 1 Here

Reading Recovery

The most extensively researched and widely used of the preventive tutoring programs is Reading Recovery. This program was originally developed by Marie Clay (1985) in New Zealand, and is widely used in that country. In 1984-85, Marie Clay and a colleague, Barbara Watson, spent a year at Ohio State University. They trained a group of teachers to use the program, and trained several Ohio State faculty members and others to train others. Since that time, research on Reading Recovery has been conducted at Ohio State, and the program has rapidly expanded in use, mainly in Ohio but increasingly in other states.

Reading Recovery provides one-to-one tutoring to first graders who score in the lowest 20% of their classes on a program-developed diagnostic survey. The tutors are certified teachers who receive train-

ing for 2 1/2 hours per week for an entire academic year. Students are tutored for 30 minutes each day until one of two things happen. If students reach the level of performance of their classmates in the middle reading group, they are "discontinued." If they receive 60 lessons without achieving this level of performance, the students are released from the program but considered "not discontinued."

The tutoring model emphasizes "learning to read by reading" (Pinnell, 1989). Each tutoring session is highly structured. Students read from little books, proceeding from a book they have previously mastered, to one they are currently working on, and then to a new book.

Students are given metacognitive strategies for predicting events in the story, using pictures and context, monitoring the correctiveness or plausibility of their own reading, and correcting their own errors. The little books typically use predictable stories but not phonetically controlled vocabulary. Phonetic cues are taught only when students need them. For example, if a child cannot figure out a phonetically regular word, the teacher might have him or her break down the sounds in the word and then blend the sounds, but no separate phonics instruction is given. Students are often asked to dictate sentences which the teacher copies on sentence strips, cuts into words, and has students reassemble. Students usually write a brief story or message. The program uses a rapid instructional pace with a great deal of praise and support.

The tutoring model in Reading Recovery is entirely separate from the instruction provided in the regular classroom. Most often, Reading Recovery teachers tutor students one-to-one half time and tutor small groups of Chapter 1 students the other half. The tutees may thus have the same teacher as their reading teacher and as their tutor, but in general this does not occur.

Research evaluating Reading Recovery in New Zealand (Clay, 1985) focused entirely on the "discontinued" students (those who were successful in the program), and therefore greatly overstates the effectiveness of the intervention. However, the U.S. research has included "discontinued" and "not discontinued" students -- all of the students who either graduated from the program or received at least 60 lessons.

The Ohio State group has conducted two longitudinal studies comparing Reading Recovery to traditional Chapter 1 pullout or in-class methods. The first (pilot) study (Huck & Pinnell, 1986; Pinnell, 1988) of Reading Recovery involved 21 teachers trained by Marie Clay who worked in six inner-city Columbus, Ohio schools. Each school provided one Reading Recovery class and a matched comparison class. The lowest 20% of students in each class served as the experimental and control group, respectively. Students were pretested in September and December, 1984, but the tutoring did not begin until the spring semester, 1985.

The second longitudinal study (Pinnell, Short, Lyons, & Young, 1986; DeFord, Pinnell, Lyons, & Young, 1988) involved 32 teachers in twelve schools in Columbus. Twelve of these teachers had been tutors in the pilot cohort. In this study, students in the lowest 20% of their classes were randomly assigned to Reading Recovery or control conditions. The research design originally made a distinction between students in the experimental and control groups who had Reading Recovery-trained vs. non-Reading Recovery-trained teachers in their regular reading program. However, there were no differences on this factor, so the analyses focused on tutored vs. untutored children, regardless of who their regular reading teacher was.

Tables 2 and 3 Here

The results at the end of the first implementation year for the two Ohio State studies are summarized in Table 2. The measures used were all individually administered scales designed either by Marie Clay and her associates or by the Ohio State researchers. Reading Recovery students substantially outperformed control students on almost all measures. The exceptions were tests of letter identification and a word recognition scale which had apparent ceiling effects in both conditions.

Each spring for two years following the implementation year, all children were assessed on Text Reading Level, an individually administered test in which students are asked to read from books with progressively more difficult content. This measure yields a reading level (e.g., second grade, first semester).

The results on this measure, summarized in Table 3, show an interesting statistical paradox. By the criterion of effect size, the effects of Reading Recovery are clearly diminishing each year. By the end of the third grade, the effect size for the pilot cohort has diminished from +.72 to +.14, and in the second cohort the effect size diminished from +.78 to +.25. On the other hand, the difference in raw units between Reading Recovery and control students remained about the same across all three years, hovering around two points in the pilot cohort and three in the second cohort. Is the effect maintaining or not?

The difference between these two measures is that the standard deviation of the Text Reading Level measure increases each year, making the same raw difference a smaller proportion of the standard deviation. In more substantive terms, the size of the difference may not be diminishing (assuming the measure is an equal-interval scale), but the importance of the difference is diminishing. For example, a difference of three months on a standardized reading test might be a big difference at the end of the first grade but is a small one at the end of sixth grade.

Actually, there is a more complex story on the longitudinal effects of Reading Recovery. The students who succeeded in Reading Recovery, those categorized as "discontinued," were performing on average at a level like that of their classes as a whole, and substantially better than the comparison group of low achievers. On the other hand, all of the "not discontinued" students (who had at least 60 tutoring sessions but failed to achieve at the level of the rest of their class) were still below the level of their classmates by third grade, and were substantially lower than the control group. These "not discontinued" students represented 27% of the former Reading Recovery students tested in the third grade in the second cohort study (DeFord et al., 1988).

The effects of Reading Recovery on promotions from grade to grade. Participation in Reading Recovery increased students' chances of being promoted to the second grade in comparison to the control low achievers. While 31% of comparison students were retained in first grade or assigned to special education, this happened to only 22% of Reading Recovery students (DeFord et al., 1988). However, by third grade this difference had mostly disappeared. A total of 59.6% of Reading Recovery children and 57.8% of control children were in the third grade two years after first grade.

There are a few methodological issues worth raising about the Reading Recovery research. First, all measures reported were designed by the developers of the program, and therefore may be biased in favor of the kinds of skills taught in the program. This is most likely at the low levels of the Text Reading Level measure, where assessments focus on concepts of print, using pictures and patterns to guess story content, and other skills specifically taught in Reading Recovery. In addition, the assessments were administered by Reading Recovery teachers. The teachers tested students in schools other than their own, and they did not know which students were in which group, but Reading Recovery teachers may be more likely to consider the skills taught in the program to constitute reading than would other teachers or testers.

Finally, Reading Recovery has a policy of not serving students who have already been retained in first grade and students identified from special education. One of the reports (Pinnell et al., 1986) implies that some students originally selected for tutoring failed to make adequate progress in early tutoring sessions and were excused from tutoring (and therefore excluded from the evaluation). Any of these practices might have influenced the Reading Recovery sample by excluding the very lowest achievers.

These criticisms aside, the efforts of Reading Recovery are impressive at the end of the implementation year, and they maintain for at least two years. The rapidly expanding use of Reading Recovery throughout the U.S. (see Lyons, Pinnell, DeFord, McCarrier, & Schnug, 1989) shows that the program is practical to use.

Success for All

Success for All (Slavin, Madden, Karweit, Livermon, & Dolan, in press; Slavin, Madden, Karweit, Dolan, & Wasik, 1990) is a comprehensive schoolwide restructuring program that is designed

primarily for schools serving large numbers of disadvantaged students. Its main intention is to see that all children are successful in basic skills, particularly reading, the first time they are taught. One major element of Success for All is one-to-one tutoring by certified teachers for students in grades 1-3 who are having difficulties learning to read. The program includes many other elements, such as an innovative beginning reading program, preschool and kindergarten programs, and family support services. However, for low-achieving first graders, who receive most of the tutoring services, the Success for All program can be primarily seen as a preventive tutoring program.

The tutoring model used in Success for All is different in many ways from that used in Reading Recovery. One difference is that in Success for All, the tutoring model is completely integrated with the reading program. The tutor's most important responsibility is to make sure that the student is making adequate progress on the specific skills and concepts being taught in the reading class; if the reading class is working on words like "mat," "cat," and "sat," the tutor will see that the student has mastered these words.

Another difference is that in Success for All, first graders receive tutoring as long as they need it. Although most students receive tutoring for part of a year, some receive it all year and then continue to be tutored into the second or even third grade. The commitment in Success for All is to see that every child succeeds, that no child is retained or assigned to special education except under extreme circumstances.

First graders are initially selected into tutoring in Success for All on the basis of individually administered informal reading inventories given in September. After that, however, students are assessed every eight weeks in terms of their progress through the reading curriculum. On the basis of these eight-week assessments, students who are doing well may be rotated out of tutoring as other students are rotated into tutoring. The amount of tutoring received by a given student may vary from eight weeks to the entire year.

Students receive tutoring every day for twenty minutes. This time is usually scheduled during an hour-long social studies/science block, so that tutoring represents additional time in reading.

The tutors are certified teachers recruited in the same way as other teachers. Each tutor teaches a 90-minute reading class each day (to reduce class size for reading) and then spends the rest of the day tutoring three children per hour. Because the tutors teach a reading class, they are fully aware of what the reading program is; if a child is struggling with Lesson 37, the tutor knows exactly what is required for success in Lesson 37, because he or she has taught it.

In many cases, tutors work with students who are also in their morning reading class. When scheduling does not allow this, the student's reading teacher fills out a "tutor/teacher communication form" which indicates the lesson that the student is working on in class and the teacher's assessment of the specific problems the student is having with that lesson. The tutor uses this information to plan the tutoring session. This communication ensures coordination between the classroom instruction and tutoring.

The tutors receive two days of training (along with all other beginning reading teachers) to learn to teach the Success for All beginning reading program (described below), and then they receive additional days of training on assessment and on tutoring itself. Tutors are observed and given direct feedback on the sessions.

Like Reading Recovery, the Success for All tutoring model emphasizes learning to read by reading (Madden, Slavin, Karweit, & Livermon, 1989). In addition, a strong emphasis is placed on teaching comprehension strategies. The tutor's goal is to get the students to read fluently, and also to understand what they read. Tutors are trained to explicitly teach metacognitive strategies to help students monitor their comprehension. For example, a tutor will teach a student to stop at the end of each page and ask, "Did I understand what I just read?" The students learn to check their own comprehension and to go back and reread what they did not understand.

Each tutoring session is structured, but the tutor is constantly diagnosing and assessing the individual needs of each student and tailoring the sessions to fit the student's specific problem. If a student is having difficulty with fluency, the tutor will have the student do repeated reading of a story. With similar materials, a tutor may work with another child on comprehension monitoring.

A typical tutoring session begins with the student reading a familiar story that he or she has read before in tutoring and in the reading class. This is followed by a one-minute drill of letter sounds to give the student the opportunity to practice the letter sounds taught in class. The major portion of the tutoring session is spent on reading "shared stories" that correspond to the beginning reading lessons. The shared stories are interesting, predictive stories which have phonetically controlled vocabulary. The tutor works with the student to sound out the phonetically regular words, asks comprehension questions about the story, and has the student reread passages to practice fluency. Writing activities are also incorporated into the reading activities.

As noted, the tutoring model is closely integrated with the reading program (Madden, Slavin, Livermon, Karweit, & Stevens, 1987), in which students are regrouped according to their reading levels (i.e., a 2.1 reading class might have first, second, and third graders). Use of tutors as reading teachers allows schools to reduce class size to about 15 students who are all at one level, so there are no multiple reading groups in class. This allows teachers to spend the entire class period actively teaching reading, as it removes the need for the followup or seatwork activities typical of classes with multiple reading groups. The beginning reading program emphasizes reading to students, engaging students in discussions of story structure, and developing oral language skills. Students begin using phonetically regular but interesting minibooks. As letter sounds and sound blending strategies are taught, students can apply them in their books. Students do a great deal of partner reading and pair practice activities, and writing is taught along with reading.

The high degree of structure in the beginning reading program facilitates integration between initial instruction and tutoring. Expectations for each lesson are clear, so the teacher and tutor can know that they are working on the same objectives. As mentioned, integration is also facilitated by the use of brief tutor/teacher communication forms, on which each can tell the other about particular successes or problems a child is experiencing.

Research on Success for All

Success for All is currently being evaluated in several schools in four school districts. Evaluations most relevant to the tutoring aspect of the program relate to low achievers in two inner-city Baltimore schools which have adequate funding to provide a high level of tutoring services. These are Abbottston Elementary, the original pilot school, and City Springs Elementary, a fully-funded site whose implementation began a year after Abbottston. Each school was matched with a similar comparison school, and then students were individually matched on standardized reading measures. The student bodies at both schools are almost entirely African American. Seventy-six percent of Abbottston's students qualify for free lunch. City Springs serves the most disadvantaged student body in the district; all its children come from housing projects, and 96% receive free lunch. Each May, students are individually assessed on scales from the Woodcock Language Proficiency Battery (Woodcock, 1984), and the Durrell Analysis of Reading Difficulty (Durrell & Catterson, 1980).

Table 4 Here

The results for the students in grades 1-3 who scored in the lowest 25% on the pretests are summarized in Table 4. The amount of tutoring received by these students varied depending on their needs; almost all received some tutoring, but in some cases they received eight weeks, while some second or third graders at Abbottston may have received more than a year of daily tutoring.

The results shown in Table 4 indicate powerful effects of the combination of tutoring, curricular changes, and family support services used in Success for All. Low achieving first graders at Abbottston and City Springs achieved at a higher level than did their matched control groups after one year of the program (mean effect sizes = +1.01 and +.55, respectively). Abbottston low achievers who had been in the program in kindergarten and first grade scored even larger gains (mean effect size = +2.37). This second year effect should not be

compared with the second-year data for Reading Recovery; the Reading Recovery data relate to the *lasting* effect of a first-grade intervention, while those for Success for All relate to the continuing effect of a *continuing* intervention. Abbottston second graders who had been in the program since the beginning of first grade scored an average effect size of +.71. Effects for students in grades 2 and 3 in the first year and in grade 3 in the second year should be considered effects of tutoring and curricular changes as remedial rather than preventive interventions. At these levels, the effects are more mixed. Second-grade effects were positive at both schools but smaller than for first grade (mean effect sizes = +.32 and +.38, respectively), while third-grade effects were strongly positive at Abbottston both years but essentially zero at City Springs. The extremely low reading achievement of the lowest 25% of third graders at City Springs may have made effective remediation difficult.

In addition to effects on reading achievement, Abbottston Elementary substantially reduced assignments of students to special education for learning problems and essentially eliminated retentions (Slavin et al., in press).

As with Reading Recovery, there are methodological limitations to research on Success for All that may affect the results. First, because only one school was involved in each comparison, school effects could account for part of the observed differences. Lack of random assignment of schools or students also could have affected the results. The testing was done by college students who were not aware of the program in detail, but entire schools were either Success for All or control schools so it was obvious which was which.

The use of a variety of interventions means that the evaluation of Success for All is not an evaluation of a tutoring program. However, as part of the broader Success for All evaluation, the beginning reading program was evaluated without tutoring, family support, or other services in two Baltimore City schools like Abbottston. The results were very positive, but not as positive as at Abbottston. This curriculum-only study began with kindergartners in the second semester and continued the program through the end of first grade. The average effect size for low achievers in these schools was +1.26. This is substantial but not as large as that for comparable students at Abbottston who had experienced the kindergarten and first grade programs (ES = +2.37).

The effects of Success for All were particularly dramatic for the lowest-achieving quarter of students involved, but they were also very positive for the other students in the school (Slavin et al., 1990; Slavin et al., in press). However, the effects for the higher-achieving students must be ascribed to the curriculum and other program elements, as they received relatively little tutoring. The evaluation of Success for All shows the potential power of a tutoring program that is integrated with a structured reading program. Evaluations of additional years will be needed to determine whether the program's goal of success for every child is realistic. Followup studies are needed to determine the validity of the program's assumption that success through the elementary grades will have long-term consequences, but the data collected to date clearly demonstrate the program's effectiveness when used at the beginning of students' school careers.

Prevention of Learning Disabilities

Prevention of Learning Disabilities is a program developed by the Learning Disorders Unit of the New York University Medical Center that identifies first and second graders who are at risk for school failure and provides intensive instruction before they begin to fall behind in basic skills. Students involved in the program are screened in first grade using an instrument (SEARCH) which primarily focuses on neurological indicators of learning disabilities and on perceptual and general immaturity.

Using diagnostic information from SEARCH, first graders are given lessons either individually or in small groups that attempt to strengthen their areas of perceptual weakness. The instructional interventions, called TEACH, are designed primarily to build perceptual skills, such as recognition-discrimination, copying, and recall, and are administered by certified teachers in 30-minute sessions 3-5 times per week.

Prevention of Learning Disabilities differs from the other tutoring models reviewed in this paper in its focus on generalized perceptual skills rather than reading. However, improvement of reading performance is a major program goal, and reading was assessed in program evaluations. No coordination with the regular reading program is apparent in program descriptions. An evaluation of Prevention of Learning Disabilities was conducted in inner-city New York City classrooms (Silver & Hagin, 1979). Students were randomly assigned to experimental or control classes, and those in the experimental group received TEACH instruction for two years. Table 5 summarizes the findings. On reading measures as well as on perception measures, the experimental students performed substantially better than controls. A later study found that students who had a full year of TEACH performed better than those who had only a half-year.

A more recent study by Mantzicopoulos, Morrison, Stone, and Setrakian (1990) found no effects for the TEACH intervention. In this study, first graders who were identified the following year as at risk for reading failure by the SEARCH screen were assigned to three groups: a TEACH group, a phonetic tutoring, and a no-contact control group. In the phonetic tutoring group, students were given phonetic instruction, were drilled in phonetics and read phonetically regular books. This is in contrast to the TEACH group, which worked on visual-auditory discrimination activities. In both the TEACH and phonetic tutoring groups, students received one-to-one tutoring for 30-minute sessions twice a week. The findings are summarized in Table 5.

On reading measures and perceptual measures, students in the TEACH group did not perform any differently than the phonetic tutoring group or the no contact controls. Interestingly, the phonetic tutoring group did show some significant improvement in Word Attack skills compared to no-contact control.

Mantzicopoulos et al. (1990) suggest that one reason for the "no effect" of TEACH was because the high attrition rate of their students left them with a skewed sample distribution. Attrition is a factor in working with "at risk" populations.

The contradictory findings on the Prevention of Learning Disabilities projects make it difficult to interpret the effectiveness of TEACH as a tutoring model.

Table 5 Here

Wallach Tutoring Program

The Wallach Tutorial Program (Wallach & Wallach, 1976) is, like Reading Recovery and Success for All, based on the idea that students who fail to learn to read in first grade are seriously at risk, and that carefully structured tutoring intervention can prevent reading failure. In this model, students receive one-half hour of tutoring per day for a year. Unlike Reading Recovery and Success for All, the Wallach model uses paraprofessionals as tutors. The tutoring is directed to students who score below the 40th percentile on a standardized reading test.

The curriculum of the Wallach program emphasizes phoneme identification skills, in response to a finding in an earlier study (Wallach, Wallach, Dozier, & Kaplan, 1977) which indicated that at the end of kindergarten, most of a sample of disadvantaged students but few middle class students had difficulty recognizing phonemes in words read to them, such as knowing that "man" but not "house" starts with the "mmm" sound.

The program has three parts. For about 10 weeks, children are taught to recognize starting phonemes in words read to them, to recognize letters, and to associate letters and phonemes. In the second stage, students spend two to three weeks learning to sound out and blend easy words. For the remainder of the year, the children learn to apply their skills to classroom reading materials. Thus, the Wallach model begins as a completely separate tutoring program (like Reading Recovery) but later begins to integrate tutoring with classroom instruction (like Success for All).

Two studies have evaluated the Wallach model. The results of these studies are summarized in Table 6.

Table 6 Here

The first evaluation was a field test of Programmed Tutorial Reading in two inner-city Chicago schools (Wallach & Wallach, 1976). First graders who were identified at the beginning of the school year as low in "academic readiness" were randomly assigned to either tutoring or a no-treatment control. At the end of the school year, the children were tested individually on the Spache Diagnostic Reading Scales.

On the Spache Word Recognition Scale, the tutored students scored five months higher than the control (G.E. 1.8 vs. 1.3) with an effect size of +.64. On the Spache Consonant Sounds Test, the tutored students also out-performed the control group with an effect size of +.66. On the Spache Reading Passage scales, there were apparent differences favoring the tutored students but these were obscured by a floor effect on the test (which does not measure below a grade equivalent of 1.6).

A second study (Dorval, Wallach, & Wallach, 1978) evaluated the program in rural Roanoke Rapids, North Carolina. Students who received the tutoring were compared to similar students in the same school the previous year, to similar students in a comparison school who received the services of a full-time reading aide in their regular reading class, and to other students in the same comparison school who received neither tutoring nor aides. At the end of the year, students took the group-administered CTBS and were individually assessed on the Spache Word Recognition and Reading Passages scales. The various control groups did not differ from one another, so they can be pooled.

On the Spache Word Recognition Scale, the tutored students scored eight months higher than control (G.E., 2.3 vs. 1.5). Spache Reading Passages showed the tutored students to be reading at a median grade equivalent of 1.8, while control students were at a median of 1.6., but again a floor effect may account for this small difference. On the CTBS, tutored students scored at the 56th percentile, comparison students at the 34th, for an effect size of +.75.

Programmed Tutorial Reading

Programmed Tutorial Reading is a highly structured tutoring program used with first graders who are in the lowest quartile on standardized reading tests. The program was originally developed by Douglas Ellson at Indiana University. The tutors for the program are paid paraprofessionals, volunteers, or parents. Students are tutored 15 minutes per day as a supplement to regular classroom instruction.

The curriculum in Programmed Tutorial Reading is designed on the principles of programmed instruction, emphasizing small steps that students are expected to master with few errors. Lessons are cycled through a sequence of sight-reading, comprehension, and word analysis which is repeated many times. Tutors are trained in specific strategies to present items, reinforce students for correct responses, and route students through the materials according to their responses.

Several studies have evaluated Programmed Tutorial Reading, but only three of these have compared the program to control groups over meaningful time periods with non-retarded populations. Table 7 summarizes the results of these studies.

Table 7 Here

Ellson, Harris, & Barber (1968) evaluated Programmed Tutorial Reading of two durations, compared to an alternative tutoring approach of two durations over a full school year. Students were assigned to one of four tutored groups: Programmed Tutorial Reading for 15 minutes per day, Programmed Tutorial Reading for 30 minutes per day, an alternative tutoring program called Directed Tutoring for 15 minutes per day, and Directed Tutoring for 30 minutes per day. Then, a matched student was identified within the classroom of each

tutored student. The students were first graders in 20 Indianapolis schools. Most of the schools served low-income populations, but the students were selected to be representative of their schools and did not necessarily have reading problems. The Directed Tutoring program did not use the programmed materials or highly structured procedures used in Programmed Tutorial Reading, but used remedial and supplementary materials more like those typically used in classrooms or in remedial reading programs.

The results (see Table 7) indicate strong effects of the 30-minute Programmed Tutorial Reading Program on tests provided along with students' Ginn basals (mean ES = +.52), but effects on the standardized Stanford Achievement Test were near zero, as were overall effects of the 15-minute per day program. Small positive effects were found for the 15-minute per day Directed Tutoring program, but (oddly) effects of the 30-minute Directed Tutoring treatment were slightly negative. Another study, by Ellson, Barber, Engle, & Kampwerth (1965), compared 15 minutes per day of Programmed Tutorial Reading for a semester to an untreated control group. In this case, moderate positive effects were found on the three measures used (see Table 7).

The largest methodologically adequate study of Programmed Tutorial Reading was done by McCleary (1971) in Lenoir County, North Carolina. In this study, low-achieving first graders were matched and assigned to experimental or control groups. The experimental students were tutored for the entire school year for 15 minutes per day. Positive effects on the Ginn reading test were found for the sample as a whole (ES = +.37) and for the poorest readers (ES = +.40). In addition, retentions in first grade were 55% lower in the tutored group than in the non-tutored group. Taken together, the evaluations of Programmed Tutorial Reading suggest that the program has positive effects on student reading achievement, but the effects are smaller and less consistent than those for the programs which use certified teachers.

Discussion

One-to-one tutoring of low-achieving primary-grade students is without doubt one of the most effective instructional innovations available. Across ten separate studies of cohorts involving five different tutoring methods, effect sizes were substantially positive in every case.

The five tutoring programs discussed here vary enormously in curriculum, tutoring methods, integration with regular classroom instruction, and other characteristics. The studies are equally diverse in populations, measures, and procedures. But some patterns can be perceived.

First, programs which used certified teachers as tutors appeared to obtain substantially larger impacts than those which used paraprofessionals. Effect sizes for Programmed Tutorial Reading and the Wallach Tutorial Program generally fell in the range of +.20 to +.75, while those for the programs using certified teachers produced average effects from +.55 to +1.01 by the end of first grade (and Success for All low achievers who had been in the program since kindergarten averaged an effect size of +2.37 at the end of first grade). The teacher-delivered and paraprofessional-delivered models also differed in curriculum. Both the Wallach model and Programmed Tutorial Reading used highly structured, clearly described instructional materials, which in the latter program were explicitly patterned on programmed instructional methods usually designed for self-instruction. In contrast, the three teacher-administered models rely on teachers' judgment, flexibility, and knowledge of how children learn.

Only one of the programs, Success for All, is designed to integrate completely with regular classroom instruction, and this program also produced some of the largest effect sizes. However, Prevention of Learning Disabilities, also a very successful model, not only fails to integrate tutoring with classroom instruction, but does not even explicitly teach reading -- instead, it focuses on building the perceptual skills often lacking in learning disabled children.

Two studies evaluated the *cumulative* effect of one-to-one tutoring, and one study investigated the *lasting* effects after the program ended. The studies

of cumulative effects found that students who were in Success for All (Slavin et al., 1990) and Prevention of Learning Disabilities (Silver & Hagin, 1979) for two years gained more than those who were in the program for one year. Silver & Hagin (1979) also found that students who experienced Prevention of Learning Disabilities for a full year learned more than those who had it for a semester, and Ellson et al. (1968) found that gains were greater when students received 30 minutes per day of Programmed Tutorial Reading than when they received only 15 minutes.

Because one-to-one tutoring (especially by a certified teacher) is extremely expensive, the lasting effects of this approach are of great importance. Only Reading Recovery has been evaluated for lasting effects, and the results are equivocal. On one hand, the raw score gains that students made on Text Reading Level in first grade have maintained through the end of third grade in two different cohorts (Pinnell, 1988; DeFord et al., 1988). On the other hand, because standard deviations of this measure increase each year, effect size estimates have diminished each year for both cohorts.

Two of the tutorial programs, Success for All (Slavin et al., in press) and Programmed Tutorial Reading (McCleary, 1971) documented substantial reductions in retentions as a result of first grade tutoring, and Success for All (Slavin et al., in press) also showed reductions in special education referrals.

Is Tutoring Cost-Effective?

It should not come as a surprise that one-to-one tutoring of primary grade students is effective. A more important question is whether it is effective enough to justify its considerable cost. One way to address this question is to compare tutoring to other expensive interventions. For example, experiments in Tennessee, New York City, Toronto, and Indiana have reduced class size by almost half. This is the same as hiring an additional teacher for each class, who could instead be used to provide one-to-one tutoring for 20 minutes per day to about 15 students. The best and most successful of these class size experiments, a Tennessee statewide study, found a cumulative effect of substantially reducing class size from kindergarten to third grade of about +.25 (Finn, 1990), less than that found in any of the tutoring models. The effects of having aides work in the classroom have been found to be minimal in many studies (see Scheutz, 1980); the same aides could be used as tutors using models designed for that purpose, or replaced by teachers for a greater impact.

On the other hand, it is not yet established that a heavy investment in first grade will pay off in permanent gains for at-risk students. The Reading Recovery results hold out some hope for lasting gains, and the cumulative effects of Success for All also show promise for maintaining initial gains. Reductions in retentions and special education referrals, seen in two of the tutoring models, have both immediate and long-term impacts on the costs of education for low achievers. But if first grade tutoring models prove to have long-term effects either without additional intervention (as in Reading Recovery) or with low-cost continuing intervention (as in Success for All), cost-effectiveness will not be the only criterion for deciding to use these models. For if we know that large numbers of students can be successful in reading the first time they are taught, and that the success not only lasts but also builds a basis for later success in school, we will have a moral obligation to do whatever it takes to see that all students do in fact receive that which is necessary for them to succeed.

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Table 1

Characteristics of Preventive Tutoring Programs

Program	Location of Evaluation	Tutors	Tutees	Duration	Tutoring methods & Curriculum
Reading Recovery	Columbus, Ohio	Certified Reading Teachers	Low 1st Graders	30 minutes/day ranging from 12 to 20 weeks	Learning to read by reading. Reading short stories and connecting writing activities to reading. Tutors guide children to learn metacognitive strategies. No connection to classroom instruction.
Success for All	Baltimore, Maryland	Certified Teachers	Lowest 1st to 3rd Graders	20 minutes/day evaluated on 8 week cycle	Learning to read by reading. Integrated with structured phonetically-based curriculum. Emphasis on metacognitive strategies. Uses interesting classroom stories which include some phonetic vocabulary.
Prevention of Learning Disabilities	New York	Certified Teachers	1st and 2nd Graders	30 minutes/ 3 to 5 times/week	Use directed activities to teach specific perceptual and spatial skills involved in reading. Emphasis on skill acquisition. No emphasis on reading connected text. No connection with a curriculum.
Wallach & Wallach	Inner city Chicago; Rural North Carolina	Paraprofessionals	Low 1st Graders	30 minutes/day, 1 year	Phonetically-based tutoring program. Emphasis on systematic mastery of phonetic skills. Does not focus on reading-connected text. Not integrated with classroom instruction.
Programmed Tutorial Reading	Inner city Indianapolis; Lenoir City, North Carolina	Paraprofessionals	All 1st Graders	15 minutes and 30 minutes/day	Highly detailed and rigidly prescribed lessons with corresponding materials; includes sight-reading program, comprehension, and word analysis. Emphasis on skills. Partially integrated with classroom instruction.

Table 2

First-Year Evaluations of Reading Recovery

	Effect Sizes	
Measure	Pilot Cohort	Second Cohort
Letter Identification*	+.36	-.04
Word Test*	-.13	+.40
Concepts about Print	+.60	+.65
Writing Vocabulary	+.62	+.69
Dictation	+.57	+1.03
Text Reading	+.72	+.91

Note: Pilot cohort data are from Huck & Pinnell, 1986. Second cohort data are from Pinnell, Short, Lyons, & Young, 1986.

*There are apparent ceiling effects on these measures.

Table 3

Longitudinal Evaluations of Reading Recovery

	Effect Sizes (Raw Differences)	
	Pilot Cohort	Second Cohort
End of Implementation Year	+.72 (1.6)	+.78 (2.8)
One Year Followup (Grade 2)	+.29 (2.0)	+.46 (3.0)
Two Year Followup (Grade 3)	+.14 (1.8)	+.25 (2.8)

Note: All data are from individually administered Text Reading Level, assessments developed by the program developers. Pilot cohort data are from Pinnell, 1988; second cohort data are from DeFord, Pinnell, Lyons, & Young, 1988.

Table 4

Effects of Success for All on Low Achieving Students

Measure	Effect Sizes		
	Abbottston		City Springs
	Year 1	Year 2	Year 1
Grade 1:			
Woodcock Letter-Word	+.42	+1.57	+.08
Woodcock Word Attack	+1.34	+4.22	+.51
Durrell Oral Reading	+.99	+1.97	+1.14
Durrell Silent Reading	+1.30	+1.73	+.47
Grade 2:			
Woodcock Letter-Word	+.39	+.39	+.21
Woodcock Word Attack	+.73	+.66	+.16
Durrell Oral Reading	-.09	+.52	+.63
Durrell Silent Reading	+.23	+1.26	+.53
Grade 3:			
Woodcock Letter-Word	+.82	+1.10	-.13
Woodcock Word Attack	+2.43	+1.42	-.43
Durrell Oral Reading	+.61	+1.86	+.05
Durrell Silent Reading	+.99	+.76	.00

Note: Abbottston Year 1 results are from Slavin, Madden, Karweit, Livermon, & Dolan, in press. Abbottston Year 2 and City Springs results are from Slavin, Madden, Karweit, Dolan, & Wasik, 1990.

Table 5

Effects of Prevention of Learning Disabilities on At-Risk Students

Measures	Effect Sizes	
Silver & Hagen, 1979	End of Grade 1	End of Grade 2
SEARCH (Perception)	+.99	--
WRAT (Oral Reading)	+.85	+1.06
Woodcock Work Identification	+.94	+.91
Woodcock Word Attack	+1.39	+1.67
SRA Comprehension	--	+.95

Mantzicopoulou et al (1990)	TEACH vs. Control		Phonetic vs. Control	
Total Reading Achievement	End of 1st Grade	End of 2nd Grade	End of 1st Grade	End of 2nd Grade
Combined SAT, CTBS, CAT	+.16	+.21	+.28	+.13

Table 6

Grade Equivalent Differences & Effect Sizes for Wallach & Wallach

Measures	Grade Equivalent Differences	Effect Sizes
	Tutored vs. Match Control	
Wallach & Wallach (1976)		
Spache Word Recognition	*+.5	+.64
Spache Consonant Sound Test		+.66
	Tutored vs. Control Group	
Dorval, Wallach & Wallach (1978)		
Spache Word Recognition	*+.8	--
Spache Reading Paassages	*+1.6 + 1.8	--
CTBS	--	+.75

*Computation based on median scores

Table 7

Effects of Programmed Tutoring vs. Directed Tutoring

	Effect Sizes			
	Program Tutoring		Directed Tutoring	
Measures	15 Min. vs. Control	30 Min. vs. Control	15 Min. vs. Control	30 Min. vs. Control
Ellson et. al. (1968)				
Ginn Total Vocabulary	+.09	+.57	+.23	-.07
Ginn Total Comprehension	+.13	+.53	+.10	-.21
Ginn Total Word Analysis	-.19	+.46	+.28	-.01
Stanford	+.01	+.18	+.41	-.17
Ellson et. al. (1965)				
Total Ginn Score	+.33			
Total Word Analysis Score	+.36			
Word Recall Score	+.78			
McCleary (1971)				
Ginn Achievement (All students)	+.40			
Ginn Achievement (Poor students only)	+.37			